Abstract of the Disclosure

A method for forming a contact hole of a semiconductor device, wherein a polymer residual on a bottom surface of the contact hole is treated with plasma of mixture gas containing oxygen to convert the polymer residual into a pure silicon oxide film free of carbon and fluorine for easy removal in a subsequent washing process is disclosed. The method comprises (a) sequentially forming a capping layer and a planarized interlayer insulating film on a semiconductor substrate having a predetermined lower structure; (b) selectively etching the interlayer insulating film to expose a predetermined region of the capping layer; (c) removing the exposed capping layer; (d) subjecting the resulting structure to a plasma treatment using a mixture gas containing oxygen; and (e) performing a cleaning process.